

Testimony of

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Energy and Commerce Committee
United States House of Representatives

“A Review of Efforts to Prevent and Treat Traumatic Brain Injury”

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Good afternoon. Thank you Chairman Pitts, Ranking Member Pallone and distinguished members of the Subcommittee for calling this hearing and drawing attention to traumatic brain injury, the leading cause of injury death in children. I am honored to have been invited to testify. I am encouraged to see the increased focus on this very serious issue along with the emergent emphasis on prevention.

My name is Dr. Flaura Koplín Winston. I serve as Scientific Director and Founder of The Children's Hospital of Philadelphia Research Institute's Center for Injury Research and Prevention and Professor of Pediatrics at the University of Pennsylvania. In addition to being a doctorally-trained bioengineer, I am a board-certified, practicing pediatrician. The Children's Hospital of Philadelphia, or CHOP as it is more widely known, is the nation's largest pediatric healthcare network with over 50 locations throughout Pennsylvania and New Jersey, and over 1 million patient encounters every year. CHOP has consistently been a world leader in the advancement of healthcare for children by integrating its mission of excellent patient care, innovative research and high-quality professional education, along with advocacy, into all of its programs.

I came to care about pediatric brain injury from my earliest days in training at CHOP and Penn. As a pediatric medical resident, when I would hear the PennStar helicopter landing on the roof, I felt a sense of dread for the family whose life would be changed by their child's traumatic brain injury. The leading causes of pediatric traumatic brain injury (TBI) occur with motor

vehicle crashes, sports, falls and child abuse – largely preventable events with very costly outcomes. Head injuries were and remain very common. Each year, over 6,000 children and youth 0-19 years of age die from TBI, but deaths are just the “tip of the iceberg.” An additional 60,000 children and adolescents are hospitalized, many suffering lifelong disabilities, and over 600,000 are treated in emergency departments each year for TBI. The cost to our nation’s families associated with caring for pediatric brain injuries is too high. The primary goal must be to reduce the number of injuries. I suggest the metric on which to measure our nation’s response: the number and severity of these injuries that occur each year.

In my testimony, I will focus on three main points in regard to pediatric traumatic brain injury: (1) prevention; (2) the need for timely and proficient acute care within the hours or days post-injury; and (3) recovery and reintegration into society.

The good news is that unlike with many other neurological conditions, we know the underlying cause of traumatic brain injury. When a brain is exposed to mechanical energy that exceeds its tolerance, injury occurs. However, as the majority of research efforts have focused on adult brain injury, the scientific foundation for pediatric brain injury is limited. Children are not small adults: traumatic brain injury in children is quite different from that of adults and varies across the pediatric age range. The brain is undergoing active development at least through age 25, changing structurally and functionally, which affects prognosis and influences the way care needs to be delivered. Although it was once believed that the immature brain is more resilient than that of an adult, recent data show that this is untrue, especially for the youngest children

who have the worst outcomes. In fact, prognosis for severely brain-injured children under the age of two is poor and comparable to that of the elderly. Also, when compared to adults, children and adolescents are more vulnerable to the long-term effects of concussion and recover more slowly. It is important to take caution when referring to concussions in children as mild as they are still brain injuries. Many lead to poor neurological outcomes that adversely affect the child's quality of life - with long lasting neurocognitive deficits such as impaired thinking, memory problems, and emotional or behavioral changes.

I want to emphasize the most important point - the brain is the organ that is least able to heal. Therefore, prevention is the best medicine and should be a primary strategy for maximum impact and return on investment. Research thus far has shown that something as simple as wearing a bike helmet or putting children in age and weight appropriate car-seats or boosters prevents life-altering injury and saves lives. However, many proven effective strategies to prevent brain injury are not fully implemented while others were designed for adults but not optimized for the developing, pediatric brain. New and improved child-focused strategies will only emerge from investments in basic and translational biomechanical, behavioral, and medical research to inform new safety products and their testing, new programs and new policies.

It was this type of funding and research that helped me identify airbag-related deaths in children, determining that these early airbags, designed to save adult lives in motor vehicle crashes, could actually cause a fatality in a child. This research informed efforts by the National

Highway Traffic Safety Administration, industry and other stakeholders-- all focused on reducing child injury. Advanced airbags, new policy and education emerged. And now child airbag deaths are rare. Dramatic prevention successes like these have taught me that we can prevent injury with strong science and its application to protect children in a world designed for adults.

Should a brain injury occur, timely and proficient acute care is vital. Delayed or inappropriate care can worsen the insult, resulting in secondary damage, and upset the delicate balance needed for healing. For the more severe brain injuries, we often refer to the hours after an injury as the “golden window” during which time the initiation of aggressive care, as needed, can reduce the secondary injuries. Emergency medical services for children and pediatric trauma centers such as CHOP are vital to this level of care. For less severe traumatic brain injuries, cognitive and physical rest must be initiated immediately – with the first 48 hours proving crucial to recovery. As many of these children with mild TBI may not come to hospitals, primary care physicians, schools and sports leagues need to be aware of the latest recommendations and implement them.

Federal funding has been crucial to advancing our understanding of the injured pediatric brain and its recovery and this work is informing new therapeutics. I encourage the National Institutes of Health (NIH) and other federal agencies to continue to invest in understanding why and how a blow to the head turns into a devastating brain injury and what we can do to mitigate that. Accordingly, I respectfully suggest that Congress build upon this important

commitment to the NIH and all federal agencies that have a vested interest in pediatric brain injury. Further, it is vital that the infrastructure is in place to rapidly translate science into tested treatments and then into clinical care.

Recovery from a brain injury can be a long and challenging road for children and their families. For many victims of traumatic brain injury, full recovery is not possible. Here, too, an enhanced scientific foundation and its translation will lead to major advances. For now, to ensure that children with traumatic brain injuries reach their full potential, sustained and coordinated multidisciplinary rehabilitation and support for the families is needed to address the physical, psychosocial and cognitive needs.

As a general pediatrician, I see children and their families whose lives are forever changed both by the acute injury and by its long-lasting effects on the child and the family members who must care for him. It is here that I see a commonality with other forms of neurologic or neurodevelopmental conditions, such as stroke, meningitis, tumors and autism. Injured children and their parents can suffer post-traumatic stress reactions following the injury which get in the way of recovery. Families often describe themselves as “lost at sea” without the services and coordination needed for rehabilitation and reintegration – such as training healthy brain cells to take on the tasks of the dead brain cells to help a child talk, walk, or cognitively process new information. Clinicians, communities and schools need to work together to reintegrate the child and his new special needs and optimize a functional recovery. Evidence-based care models and tested and proven effective online resources are needed to support these efforts.

Children and adolescents with TBI depend on the coordinated efforts of our health, education and labor sectors for the support they need.

As evidenced by this hearing today, pediatric brain injury prevention has many stakeholders. There are clear roles for everyone in this room. Improved implementation of proven effective programs, products and policies will result from coordination, cooperation and communication across governmental departments and non-governmental organizations. For example, the National Science Foundation has presented us with multiple opportunities to not only partner with government but also with industry to field real results in child injury prevention and these efforts have been wildly successful.

Further, the CDC will be releasing a National Action Plan for Child Injury Prevention which will provide action steps that can be taken in areas such as research, data, education, and health systems to prevent child injuries from occurring. It also seeks to incorporate child injury prevention into existing systems and strategies at the national, state, and local level. I was honored to participate in the work-group that created this important document, which will provide a meaningful roadmap for ensuring better health outcomes for America's children.

I close today by thanking you for giving this issue the attention it deserves and for bringing together this panel to discuss it. Although no single effort will provide the solution to this complex problem, I've shed light on a number of ways we can tackle this issue. It will take coordinated efforts by multiple governmental departments and agencies, industry and

nongovernmental organizations, communities, schools and families to optimize our response. Fortunately, there is a well-established public health framework for success that identifies the key opportunities for reducing the impact of traumatic brain injuries on children. This includes preventing the injury-producing event, reducing the likelihood and severity of any resulting injury, and optimizing treatment and recovery.

A month ago I was interviewed by elementary school students as one of their heroes because I save lives. They, too, want to save lives. But I worry that their dreams are limited because we have not shored up the necessary training and funding opportunities they need to become tomorrow's investigators, inventors and clinicians in pediatric injury.

I want to close by leaving you with a frightening statistic: today alone, 15 children will die of traumatic brain injury, an additional 150 will be hospitalized and 1500 will be treated in an emergency department. It is because of these staggering statistics that I have devoted my professional life to the prevention and treatment of pediatric injury. We can stem the pediatric brain injury epidemic and reduce the incidence of devastating injuries and poor outcomes with increased awareness, resources, research and coordination.

Mr. Chairman, Ranking Member Pallone and members of the Subcommittee, I thank you again for inviting me to testify and look forward to answering your questions.

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I came to care about pediatric brain injury from my earliest days in training at CHOP and Penn. As a pediatric medical resident, when I would hear the PennStar helicopter landing on the roof, I felt a sense of dread for the family whose life would be changed by their child's traumatic brain injury. Traumatic brain injury is the leading cause of child injury death and is caused by motor vehicle crashes, sports, falls and child abuse – largely preventable events with very costly outcomes. As a nation we should measure our success by annual reductions in pediatric brain injuries. In my testimony, I will focus on three main points in regard to pediatric traumatic brain injury: (1) prevention; (2) the need for timely and proficient acute care within the hours or days post-injury; and (3) recovery and reintegration into society.

The good news is that unlike with many other neurological conditions, we know the underlying cause of traumatic brain injury. When a brain is exposed to mechanical energy that exceeds its tolerance, injury occurs. However, as the majority of research efforts have focused on adult brain injury, the scientific foundation for pediatric brain injury is limited. Children are not small adults: traumatic brain injury in children is quite different from that of adults and varies across the pediatric age range. I want to emphasize the most important point - the brain is the organ that is least able to heal. Prevention is the best medicine.

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Federal funding has been crucial to advancing our understanding of the injured pediatric brain and its recovery and this work is informing new therapeutics. I encourage the NIH and other federal agencies to continue to invest in understanding why and how a blow to the head turns into a devastating brain injury and what we can do to mitigate that. Recovery from a brain injury can be a long and challenging road for children and their families. Here, too, an enhanced scientific foundation and its translation will lead to major advances. Clinicians, communities and schools need to work together to reintegrate the child and his new special needs and optimize a functional recovery. Evidence-based care models and tested and proven effective online resources are needed to support these efforts.

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